

GEARING TOWARDS A GREENER FUTURE

Edited by:

Amir Azam Khan

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Rudiyanto Philman Jong

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Table of Contents

COLLABORATIVE LOCATION-BASED MOBILE GAME WITH ERROR DETECTION ALGORITHM	1
<i>¹Adrus Mohamad Tazuddin, ²Wong Ming Ming and ³Abang Mohamad Aizuddin</i>	
AN EMMS MIXTURE MODEL WITH BUBBLE SIZE DISTRIBUTION	2
<i>**¹Atta Ullah, ¹Iqra Jamil, ¹Shah Jehan Gillani, ¹Adnan Hamid and ²Khairuddin Sanaullah</i>	
MANAGING DESIGN CHANGE DYNAMICS IN BUILDING CONSTRUCTION: CONCEPTUALIZING A QUALITATIVE MODEL	3
<i>**¹Jeffrey Yap Boon Hui, ²Hamzah Abdul-Rahman and ³Wang Chen</i>	
GEOSPATIAL ASSESSMENT OF SOIL MOISTURE DISTRIBUTION IN CAMERON HIGHLANDS USING GIS AND REMOTE SENSING TECHNIQUES	4
<i>**Abdulkadir Taofeeq Sholagberu, Muhammad Raza Ul Mustafa, Khamaruzaman Wan Yusof and Ahmad Mustafa Hashim</i>	
PROBABILISTIC ECOTOXICOLOGICAL RISK ASSESSMENT OF IMIDAZOLIUM IONIC LIQUIDS WITH AMINO ACID AND HALIDE ANIONS	5
<i>Muhammad Ishaq Khan, **Dzulkarnain Zaini, Azmi Mohd Shariff and Muhammad Moniruzzaman</i>	
USE OF QUARRY DUST AS SAND REPLACEMENT IN STRUCTURAL CONCRETE: A REVIEW	6
<i>**Lim Chung Han, Adriana Erica Amaludin, Hassanel Zazhary Amaludin, Mohd Azizul bin Ladin and Salinah binti Dullah</i>	
EUCLIDEAN SPACE DATA PROJECTION CLASSIFIER WITH CARTESIAN GENETIC PROGRAMMING (CGP)	7
<i>**¹WK Wong, ¹Lenin Gopal, ¹Terance Tan and ²Chekima Ali</i>	
ADDITION OF CEMENT LEFTOVER FROM THE HOLLOW OF THE SPUN PILE REINFORCEMENT AS AN ADDITIVE TO SELF COMPACTING CONCRETE	8
<i>**¹A. Suraya Hani, ²A. Suzana Wati, ³Z. Muhammad Shukri, ¹O. Mohd Hairi and ³J. Zalipah</i>	
NUMERICAL ANALYSIS OF INITIAL CO ₂ BUBBLES LEAKED IN SHALLOW SEAWATER FROM OCEAN CO ₂ STORAGE USING VOLUME OF FLUID METHOD	9
<i>¹Loi Hoang Huy Phuoc Pham, **¹Risza Rusli and ²Afiq Mohd Laziz</i>	
EFFECTS OF CATALYST BED POSITION ON HYDROGEN PRODUCTION BY METHANE DECOMPOSITION	10
<i>¹Umair Sikander, **¹Suriati Sufian, ¹KuZilati KuShaari and ²Fai Kait Chong</i>	
MINIMUM IGNITION ENERGY OF ALUMINUM NANOPOWDERS AS ENGINEERED NANOMATERIALS (ENMS)	11
<i>Siti Hava Nabilah Binti Zabari, **¹Risza Binti Rusli, ¹Azizul Bin Buang and Kanapathy A/L Mohanan</i>	

THE RELATIONSHIP OF SILVER CONTENT ON FLUX OF POLYSULFONE COMPOSITE MEMBRANE	12
<i>**K. A. M. Said, R.L. Jama-in and N.A.M. Alipah</i>	
MULTIPLE-OBJECTIVE OPTIMIZATION TECHNIQUES IN LASER JOINING OF DISSIMILAR MATERIALS CLASSES: A COMPARISON BETWEEN GREY AND RATIO ANALYSES	13
<i>**¹K. F. TAMRIN, ²N. A. SHEIKH, ³M. S. M. RIDZUAN and ¹A. N. NADIRAH</i>	
INTERFACIAL FRICTION BEHAVIOR IN NARROW WALL PASTE BACKFILL SYSTEM	14
<i>¹Wee K. Ting, **¹Alsidiq Hasan, ¹Fauzan Sabdi, ¹Siti N. Taib, ¹Norsuzailina M. Sutan, ²Badhrulbisham A. Aziz and ³Andy Fourie</i>	
PASSIVE PATHOGENIC REMOVAL IN LEACHATE: MONITORING OF E. COLI COUNT	15
<i>Nurasiab Mira Anuar and **Chee-Ming Chan</i>	
WEIBULL ANALYSIS ON BANANA FIBER STRENGTH WITH VARIATION OF WITHIN FIBER CROSS-SECTIONAL AREA	16
<i>**¹Charlie Sia Chin Voon, ¹Lashane Fernando, ²Annie Joseph and ³David Chua Sing Ngie</i>	
EVOLUTION OF SHEAR STRENGTH WITH VARYING CEMENT WITH VARYING CEMENT DOSAGES IN DREDGED MARINE SOILS	17
<i>Nurul Syakeera Nordin and **Chee-Ming Chan</i>	
EFFECT OF GRANULAR INCLUSION ON THE CONSOLIDATION RATE OF DREDGED MARINE CLAY	18
<i>S.F.S.M. Johan and **C-M. Chan</i>	
KINETIC MODELING OF SUPERCRITICAL FLUID EXTRACTION OF BETEL NUT	19
<i>¹Muhammad Syafiq Hazwan Ruslan, ²Zuhaili Idham, ²Muhammad Abbas Ahmad Zaini, ²Lee Nian Yian and **²Mohd Azizi Che Yunus</i>	
THE OPTIMUM SODIUM HYDROXIDE CONCENTRATION FOR HIGH STRENGTH PLA-RICE STRAW COMPOSITES	20
<i>**Melissa Augustine Saidi, Alexander Gorin, Kok Heng Soon and Elammaran Jayamani</i>	
POWER FACTOR IMPROVEMENT IN POWER SYSTEM WITH THE INTEGRATION OF RENEWABLE ENERGY	21
<i>**¹Sim Sy Yi, ¹Goh Hui Hwang, ¹Kek Sie Long, ¹Alvin John Lim Meng Siang, ²Yonis. M. Yonis. Buswig, ¹Farahiyah Mustafa, ¹Azzurien Aida Bobari and ¹Mohd Aidil Ardi</i>	
STUDY OF MORPHOLOGICAL, OPTICAL AND ELECTRICAL PROPERTIES OF GRAPHENE OXIDE THIN FILM RELATIVE TO THE REACTION TIME OF SYNTHESIS	22
<i>**¹E.Jaafar, ¹M. Kashif, ¹SK. Sabari and ²Z. Ngaini</i>	
MULTIVOLTAGE TRACKING OF A MULTI VOLTAGE TRACKING OF A MULTI -INPUT INTERLEAVED BUCK-BOOST DC -DC CONVERTER USING ARTIFICIAL NEURAL NETWORK CONTROL	23
<i>**¹Yonis. M. Buswig, ¹Al-Khalid bin Hj Othman, ¹Norhuzaimin bin Julai, ²Sim Sy Yi, ²Wahyu Mulyo Utomo and ²Alvin John Lim Meng Siang</i>	

DESIGN OF PORTABLE 3-AXIS FILAMENT WINDING MACHINE WITH INEXPENSIVE CONTROL SYSTEM	24
<i>**¹Ma Quanjin, ¹M.R.M. Rejab, ¹M.S. Idris, ¹M. Amiruddin, ¹D. Bachtiar, ¹J.P. Siregar and ²M.I. Ibrahim</i>	
A NOVEL OPTIMIZATION OF PID CONTROLLERS FOR SECOND AND THIRD SYSTEMS	25
<i>**¹Falib S. M. Alkhabaji, W. Z. Wan Hasana, Maryam Isa and Nasri Sulaiman</i>	
ENERGY HARVESTING FROM ROTATING MOTION OF IN-PIPE ROBOT CLEANING DEVICE	26
<i>**¹Ana Sakura Zainal Abidin, ¹Tim Brandon Anak Sawing, ¹Izzat Haziq Abdullah, ¹Haymilton Yearne Melvin, ¹Shabrol Mohamaddan, ¹Annisa Jamali, ¹Rasli Muslimen, ¹Muhd Fadzi Ashari, ¹Mohd Syahmi Jamaludin and ²Hazmi Hijazi Abdul Halim</i>	
RELATIONSHIP BETWEEN UNDRAINED SHEAR STRENGTH (SU) AND CONSOLIDATION RATIO FOR MARINE SOFT CLAY	27
<i>**¹Alvin John Lim Meng Siang, ¹Sim Sy Yi and ²Yonis M. Yonis Buswig</i>	
IDENTIFICATION OF BRITTLE ZONES FOR POTENTIAL ROSENEATH SHALE GAS, COOPER BASIN, AUSTRALIA USING GEOMECHANICAL, PETROPHYSICAL AND GEOCHEMICAL PROPERTIES	28
<i>**¹Omer Iqbal, ¹Maqsood Ahmad and ²Askury Abd Kadir</i>	
LEAD COMPENSATOR DESIGN FOR SINGLE-PHASE QUASI Z-SOURCE INVERTER	30
<i>**¹Sut Khan Yong, ¹Kab Haw Law, ¹Wendy Pei Qin Ng and ²Mohamed Dahidah</i>	
CLIMATE CHANGE IMPACT ON WATER RESOURCES AVAILABILITY IN KUCHING, SARAWAK	31
<i>N. Rostam Afshar and D.N. Subaimi</i>	
DISTRIBUTED DOUBLE DIFFERENTIAL SPACE-TIME CODING WITH AMPLIFY-AND-FORWARD RELAYING	32
<i>**¹Sylvia Ong Ai Ling, Hushairi Zen, Al-Khalid Hj Othman and Khairuddin Bin Hamid</i>	
PRODUCTION OF KARANJA METHYL ESTER FROM CRUDE KARANJA OIL USING MERETRIX LYRATA SYNTHESIZED ACTIVE CAO CATALYST	33
<i>¹Dewi. H, **¹A.A. Saleh, ¹A.N.R. Reddy, ¹S. Hamdan and ²K. Charyulu</i>	
DEVELOPMENT OF KEK LAPIS SARAWAK'S AUTOMATED COOLING AND PRESSING SYSTEM BY USING PLC	34
<i>N. Junaidi, M. S. Hamsawi, A.S. Zainal Abidin, N. I Hashim, M.S. Jamaludin and S. Mohammadan</i>	
CHALLENGES AND OPPORTUNITIES OF GREEN ROOF IN BUILDING DESIGN: A CASE STUDY IN BANDAR SERI BEGAWAN	35
<i>**¹S. Shams, ²Pg Hj R. Ismandi, ³Arifin bin Haji Zania and ⁴Asmirolasmi bin Haji Mohamad</i>	
EFFECT OF FREEZING TIME AND SHAKING SPEED ON THE PERFORMANCE OF PROGRESSIVE FREEZE CONCENTRATION VIA VERTICAL FINNED CRYSTALLIZER	36
<i>¹Nurul Aini Amran, ¹Shafrah Samsuri and **²Mazura Jusob</i>	

DESIGN AND ANALYSIS OF SLOTTED RING WIDEBAND BANDPASS FILTER FOR MICROWAVE SENSOR	37
<i>**¹Dyg Norkhairunnisa Abang Zaidel, ¹Ameerul Fiqri Abu Bakar, ¹Mohd Ridhuan Mohd Sharip, ¹Dayang Azra Awang Mat, ¹Ade Syabeda Wani Marzuki and ²Dayang Norulfairuz Abang Zaidel</i>	
HIGH-GAIN MODIFIED ANTIPODAL VIVALDI ANTENNA FOR ULTRA WIDEBAND APPLICATIONS	38
<i>S. A. Adamu, **T. Masri, W. A. W. Z. Abidin and K. H. Ping</i>	
COMPRESSIBILITY AND CONSOLIDATION BEHAVIOR OF DREDGED MARINE SOILS (DMS) ADMIXED WITH CEMENT AND/OR WASTE GRANULAR MATERIALS (WGM)	39
<i>Mohd. Zawawi Rosman and **Chee-Ming Chan</i>	
DEVELOPING NOISE MAPS TO MONITOR RAILWAY TRAIN NOISE AT FOUR (4) DIFFERENT KERETAPI TANAH MELAYU (KTM) STATIONS	40
<i>**¹Selamat, F. E and ²Abdul Rahim F. L</i>	
HEAT AND FLOW CHARACTERISTICS OF NANOFLUID FLOW IN POROUS MICROCHANNELS	41
<i>**¹Ting Tiew Wei, ²Hung Yew Mun, ¹Mohammad Shahril Osman and ¹Peter Yek Nai Yuh</i>	
A STUDY ON CHICKEN FAT AS AN ALTERNATIVE FEEDSTOCK: BIODIESEL PRODUCTION, FUEL CHARACTERIZATION AND DIESEL ENGINE PERFORMANCE ANALYSIS	42
<i>Mohd Nurjiridauz Mobiddin, **A.A. Saleh, A.N.R. Reddy and S. Hamdan</i>	
A REVIEW ON RUBEN'S TUBE AS ACOUSTIC PROPAGATOR	43
<i>Rashidah Salim, **Syed Tarmizi Syed Shazali, Sinin Hamdan, Magdalene Andrew Munot and Abang Mohamad Aizuddin</i>	
ANALYSIS OF PRODUCTION PLANNING ACTIVITIES IN REMANUFACTURING SYSTEM	44
<i>**M. Andrew-Munot, A. Yassin, S.T. Syed Shazali, M. Sawawi, S. J. Tanjong and N. Razali</i>	
WIND EFFECT ON HIGH-RISE BUILDING CONFIGURATIONS FOR HAZE REDUCTION	45
<i>M. T. Jumabadi, **M. R. Saad, A. Che Idris and M. R. A. Rahman</i>	
SURFACE ANALYSIS OF THERMALLY GROWTH GE OXIDE GE(100)	46
<i>**¹S. K. Sabari, ¹N.A. Abdul Halim, ¹M. Kashif, ²M. Sawawi, ¹R. Sapawi, ¹K. Kipli and ¹N. Junaidi</i>	
INTEGRATED SAFETY AND PROCESS OPTIMIZATION APPROACH FOR AMMONIA SYNTHESIS LOOP	47
<i>Mubammad Athar, **Azmi M. Shariff, Azizul Buang and Dzulkarnain Zaini</i>	
MONITORING KINETIC AND THERMODYNAMIC PARAMETERS OF FLUORIDE ADSORPTION FROM AQUEOUS SOLUTION BY PKS-BASED ANION RESINS	48
<i>**¹M.T. Bashir, ²A. Salmiaton, ²A. Idris and ²R. Harun</i>	
TENSILE PROPERTIES OF CLAM SHELL POWDER-FILLED UNSATURATED POLYESTER COMPOSITES	49
<i>**Mahsburi Yusof, Amalina Mubammad Afifi, Norazlina M. Sa'don, Shabrol Mohamaddan and Jethro Henry Adam</i>	

Study on Effect of Volume of Gold Chloroauric Acid on Size, Shape and Stability of Biosynthesized Gold Nanoparticles using Aqueous <i>Elaeis Elaeis guineensis</i> (Oil Palm) Leaves Extract	50
<i>**¹Tausif Ahmad, ¹M. A. bin Bustam, ¹Muhammad Irfan, ¹Muhammad Moniruzzaman, ²Hafiz Muhammad Anwaar Asghar and ¹Sekhar Bhattacharjee</i>	
DESIGN AND OPTICAL MODELING OF A LOW PROFILE STATIONARY CONCENTRATING SOLAR COLLECTOR FOR MEDIUM TEMPERATURE HEAT SUPPLY	51
<i>**¹Javed Akhter, ¹S. I. Gilani, ²Muzaaffar Ali and ³S. Z. A. Gilani</i>	
A STUDY ON THE PERFORMANCE OF PPODM- CNF MIXED MATRIX MEMBRANE FOR CO ₂ /CH ₄ SEPARATION	52
<i>Murugiah P.S, **Ob P.C. and Lau K.K</i>	
EFFECT OF PASTE VISCOSITY ON DIRECT-CURRENT RESISTANCE IN IMPROVING THE EFFICIENCY OF DYE-SENSITIZED SOLAR CELL	53
<i>¹Siti Nur Azella Zaine and **²Norani Muti Mohamed</i>	
THE EFFECT OF AMINE SUBSTITUENT CHAIN LENGTH ON POLYHEDRAL OLIGOMERIC SILSESQUOXANE/POLYSULFONE MIXED MATRIX MEMBRANE	54
<i>**Y. C. Bong, P. C. Ob and T. L. Chew</i>	
IDENTIFICATION AND QUANTIFICATION OF CO ₂ SOLIDIFICATION IN CRYOGENIC CO ₂ CAPTURE FROM NATURAL GAS	55
<i>Muhammad Babar, **Mohamad Azmi Bustam, Abulbassan Ali and Abdulhalim Shah Maulud</i>	
THE EFFECTS OF AMINE FUNCTIONALIZATION ON ZEOLITE T/6FDA - DURENE MIXED MATRIX MEMBRANES FOR CO ₂ /CH ₄ SEPARATION	56
<i>Normahyu Jusoh, **Yin Fong Yeong, Kok Keong Lau and Azmi Mohd Shariff</i>	
EFFECT OF INTERPHASE REGION AND NEIGHBORING PARTICLES ON ELECTRIC FIELD INTENSITY WITHIN NANOCOMPOSITE SYSTEMS	57
<i>**M. R. M. Sharip, D. N. A. Zaidel, M. H. I. Saad, A. S. Abdullah, N. I. Hashim and A. K. Rahman</i>	
PREPARATION OF MIXED MATRIX MEMBRANE USING CELLULOSE ACETATE INCORPORATED WITH SYNTHESIZED KIT-6 SILICA	58
<i>S. H. Ding, **T. L. Chew, P. C. Ob and A. L. Ahmad</i>	
MULTI-HOLES CONFIGURATIONS OF WOVEN FABRIC KENAF COMPOSITE PLATES: EXPERIMENTAL WORKS AND 2-D MODELLING	59
<i>**Khairi Supar and Hilton Ahmad</i>	
IMPLEMENTATION OF SAFETY PERFORMANCE FRAMEWORK (SPF) IN PROCESS INDUSTRIES TO AVOID DISASTERS	60
<i>¹Muhammad Yasir Shamim, **¹Azizul Buang, ¹Azmi Mohd Shariff and ²Hirra Anjum</i>	
SYNTHESIS OF HIGH MOLECULAR WEIGHT POLYIMIDE CONSISTING HEXAFLUOROISOPROPYLIDENE MOIETY FOR GAS SEPARATION	61
<i>N. A. Mokri, **P. C. Ob, H. Mukhtar and T. L. Chew</i>	

GRAPHENE OXIDE AS AN EFFICIENT PHOTOCATALYST PHOTOCATALYTIC REDUCTION OF CO ₂ INTO SOLAR FUEL	62
<i>¹Nasir Shehzad, ¹Thanabalan Murugesan, ^{**1}Khairiraihanna Jobari and ²Muhammad Tahir</i>	
ANALYSIS OF GATE POLY DELAYERING IN SOI WAFER	63
<i>¹Handie Ahmataku, ^{**2}Shabrol Mohamaddan, ¹Emilda Warren, ²Mahsburi Yusuf, ²Aidil Azli Alias, ³Nor Hasmaliana Abdul Manas, ⁴Kuryati Kipli and ²Mohamad Syazwan Zafwan Mohamad Suffian</i>	
DESIGN, FABRICATION AND EVALUATION OF A NEW KEROPOK KEPING DRYING MACHINE	64
<i>¹M.N. Leman, ^{**2}S. Mohamaddan, ²M.S.Z. Mohamad Suffian, ²A.M. Aizuddin, ²A.S. Zainal Abidin, ²A.M.N. Abg Kamarudin, ³N. Junaidi and ³N.A.A. Mohadzgar</i>	
IMPROVEMENT OF THE BANDWIDTH AND SCATTERING PARAMETER PERFORMANCES OF 5G BRANCH-LINE COUPLER DESIGN FOR USE IN INTELLIGENT TRANSPORTATION SYSTEM (ITS)	65
<i>^{1**}Dyg Norhairunnisa ¹Abang Zaidel, ¹Melvin Philip Attan, ¹Mohd Ridhuan Mohd Sharip, ¹Dyg Azra Awang Mat, ¹Ade Syabeda Wani Marzuki, ²Norbudab Seman and ³Yi Lung Then</i>	
IMPACT OF COVER/BAR DIAMETER RATIO TO THE STRUCTURAL PERFORMANCE OF REINFORCED CONCRETE MEMBER DUE TO CORROSION	66
<i>^{**}Hamidun Mohd Nob and Nur'Ain Idris</i>	
THE USE OF MFA AND LCA IN THE AGRICULTURE WASTE MANAGEMENT SYSTEM IN KUALA TERENGGANU	67
<i>^{**1}Latifah Abdul Ghani, ²Noor Zalina Mahmood and ³Nora'aini Ali</i>	
DESIGN OF CMOS POWER AMPLIFIER WITH RESISTIVE FEEDBACK AND NOTCH FILTER FOR UWB SYSTEMS	68
<i>D.S.A.A. Yusuf, ^{**}R. Sapawi, S.M.W. Masra, S.K. Sabari, M. Sawawi, D.A.A. Mat, A.S.W Marzuki</i>	
ENHANCED GASES SEPARATION OF CELLULOSE ACETATE (CA) MEMBRANE USING N-METHYL-2-PYRROLIDONE AS FABRICATION SOLVENT	69
<i>Muhammad Mubashir, ^{**}Yeong Yin Fong, Chew Thiam Leng, Lau Kok Keong.</i>	
ARTIFICIAL NEURAL NETWORK APPLICATIONS FOR PREDICTING DRAG COEFFICIENT IN FLEXIBLE VEGETATED CHANNELS	70
<i>^{**1,2}Muhammad Mujabid Muhammad, ¹Khamaruzaman Wan Yusof, ¹Muhammad Raza Ul Mustafa, ³Nor Azazi Zakaria and ³Aminuddin Ab. Ghani</i>	
DESIGN CONSIDERATIONS OF AN ADVANCED FLOOD CAUTIONARY SIGN FOR VEHICLES SAFETY AT LOW LYING AREAS	71
<i>^{**}Syed Muszamil Hussain Shah, Zahiraniza Mustaffa, Khamaruzaman Wan Yusof, Mohd Zaid Zainuddin, Meor Asniwan Mew Ghazali and Mohamad Idris Mokhtar</i>	
DEVELOPMENT OF A CUTTING EDGE TEMPERATURE MEASUREMENT OF END MILL TOOL BY USING INFRARED RADIATION TECHNIQUE	72
<i>Mohammad Asbaari Kiprawi, ^{**}Abdullah Yassin, Syed Tarmizi Syed Shazali, M. Shabidul Islam, Mohd Azrin Mohd Said</i>	
INTEGRATING STUDENT CLASS ATTENDANCE INTO UNIVERSITY INFORMATION SYSTEM FOR SEAMLESS MONITORING APPROACH	73
<i>^{**}Rosmaini Tasmin, ²Azamuddin Rasidi, ²Shabril Nazim Mohd Salleh ³Mohd Saufi Cbe Rusuli</i>	

EFFECTS OF HYDRAULIC RETENTION TIME AND SOLID RETENTION TIME OF POME ON COD REMOVAL EFFICIENCY	75
<i>**M. S. Islam, R. Baini, S. J. Tanjong, M. A. M. Said and J. J. Eugene</i>	
ELECTROMAGNETIC FIELD SCATTERING OF A HIGH SPEED MOVING SOURCE AND ITS APPLICATION	76
<i>**¹Shafrida Sabrani, ¹Nor Shafrillab Isa, ¹Kismet Anak Hong Ping, ²Tatsuya Akata and ²Michiko Kuroda</i>	
Hydrocarbon-Selective Catalytic Reduction as Nitrogen Oxides Emissions Reduction: Review	77
<i>**¹Sherra Bellina Barrabas, ¹Rubiyah Baini, ²Norsuzailina Mohamed Sutan and ¹Ibrahim Yakub</i>	
WATER TREE SIMULATION ON UNDERGROUND POLYMERIC CABLE USING FINITE USING FINITE METHOD	78
<i>¹Mubatzfab Mohd Salleh, ²Mohd Hafiez Izwan Saad, **²Yannuar Z. Arief and ³Nor Asiah Muhamad</i>	
HIGH VOLTAGE STRESS DISTRIBUTION PHENOMENA ON LIQUID AND SOLID INSULATION MATERIAL USING FINITE ELEMENT METHOD	79
<i>**¹Yannuar Z. Arief, ³Nor Asiah Muhamad, ¹Mohd Hafiez Izwan Saad, ²Syazwan Nazri, ²Siti Nur Anina Othman and ²Mohd Fikri Hilmi Mohd Taib</i>	
STUDY ON INFLUENCE OF MOISTURE CONTENT IN CEMENT STABILIZED SERIAN SOIL	80
<i>**S.N.L. Taib, S. Striprabu, F. Ahmad, K.C.Y. Foo and L.S.B. Khor</i>	
INDEX	81

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COLLABORATIVE LOCATION-BASED MOBILE GAME WITH ERROR DETECTION ALGORITHM

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Abstract

In the recent years, there has been an evolution in game input medium. From just using buttons, players can now interact with games through a wider spectrum of inputs which includes touch screen, camera, light sensor, accelerometer, compass and GPS. This is driven by the availability of these modules and sensors within mobile devices that are omnipresent nowadays. As a result, there has been a creative breakthrough on how games are played today where gaming experience can be made more intuitive and immersive. Localization is one of the input medium where the player's physical location is used as part of the gameplay. This paper proposes an original gameplay schema that utilizes indoor mobile Wi-Fi localization technique as game input that does not require additional infrastructure. The game takes advantage of the weakness of Wi-Fi localization where environmental influence is significant and make it part of the gameplay. A simple error detection algorithm is also introduced to maximize the game playability value by balancing game responsiveness and accuracy level.

Keywords: technology, Wi-Fi localization, location-based games, pervasive games

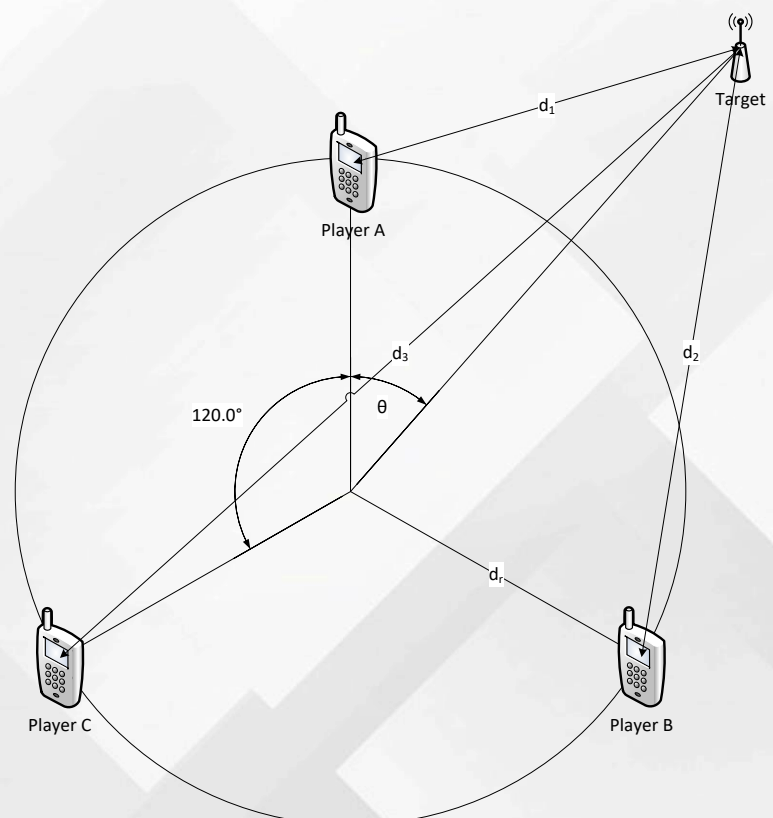


Fig. 1 Scanning for the opposing team's target.

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AN EMMS MIXTURE MODEL WITH BUBBLE SIZE DISTRIBUTION

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Abstract

Modeling of fluidized beds with special focus on mesoscale structures has become prominent area of research in recent years. These efforts have focused on incorporating the effects of bubbles and clusters on the bed hydrodynamics. To account for the effects of these mesoscale bubbles on hydrodynamics of gas fluidized beds, appropriate sub-grid models are required. Energy Minimization Multiscale Modeling (EMMS) is one of the promising approaches available to this end. Present work focuses on development of an EMMS modeling approach where a bubble size distribution has been considered. In this work, bubble based EMMS mixture model developed earlier by same team has been modified. To consider the distribution, user defined values of minimum ($d_{b,min}$) and maximum diameter ($d_{b,max}$) are specified. As a first test case, a uniform bubble size distribution was followed. Due to the distribution, drag force was considered to comprise of contribution from each size group. The mathematical form of the objective function describing the energy for suspension and transport has not been altered. The heterogeneity index (H_d) from this new drag modification is then used to simulate turbulent fluidized beds of Group A and B particles.

Keywords: EMMS, CFD, turbulent bed, fluidization, multiphase

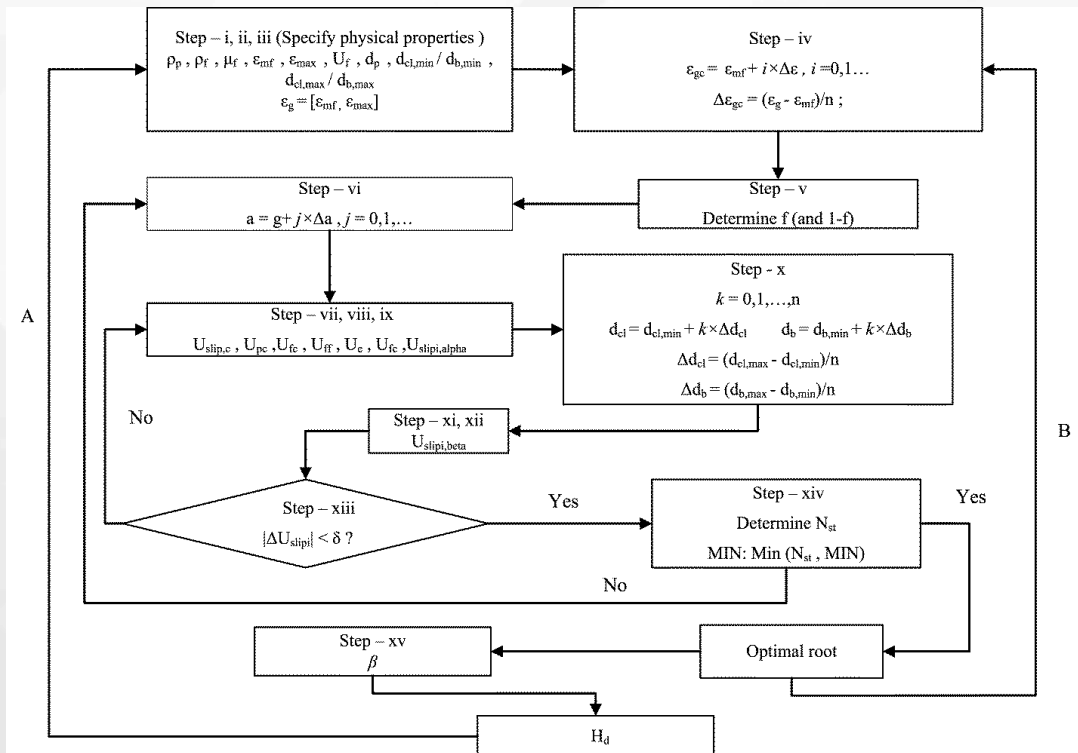


Fig. 2 Algorithm for calculation of heterogeneity index with EMMS mixture model.

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Design changes are inevitable in building construction. The systemic effects of design changes are often under-estimated, triggering considerable overruns in project schedule and costs. To improve the understanding of the causal nature of design changes and its dynamic impacts on project performance, a causal loop model is conceptualized using system dynamics approach. The model facilitates project learning with the use of graphical representation of cause and effect feedback processes. The dynamic hypotheses indicate that effective communication improves design management and reusable project knowledge delimits design changes. Qualitative semi-structured interviews with twelve practitioners were conducted to gain insights on the causal relationship of the key variables. The conceptualized model is possibly the first ever model to correlate strategic management of design changes. This study addresses the current methodological gap in construction project management research that lacks system thinking and demonstrable causality with effective communication management and learning through past project experience and knowledge reuse for improved project delivery in the built environment.

**Corresponding author

Paper No.
06-2017

GEOSPATIAL ASSESSMENT OF SOIL MOISTURE DISTRIBUTION IN CAMERON HIGHLANDS USING GIS AND REMOTE SENSING TECHNIQUES

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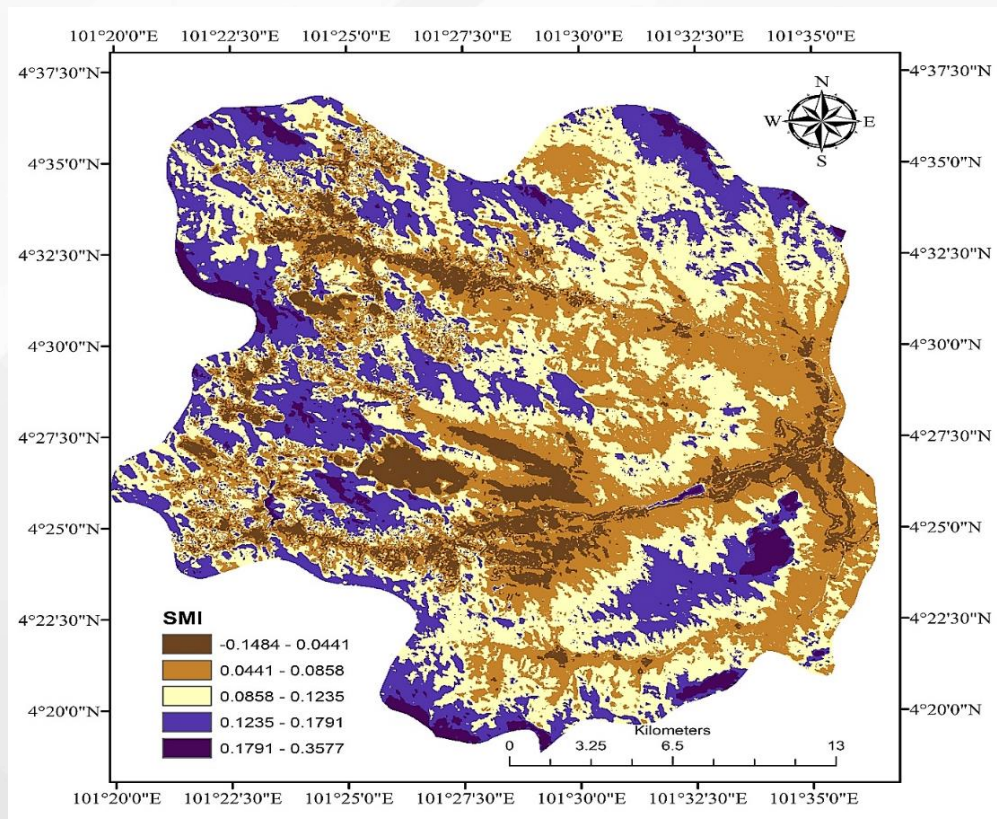
Abstract

Soil moisture is a significant unit of hydrological cycle that influences groundwater recharge and surface runoff. The expensive and laborious nature of ground-based measurement of soil moisture has called for application of remote sensing and geographic information system techniques. An investigation into soil moisture status is paramount to land degradation and desertification assessment. This study is therefore aimed at assessing the satellite derived LST-NDVI relationship for evaluation of geospatial distribution of soil moisture and evaluating its distributional pattern in mountainous Cameron Highlands watershed. Satellite sensors of Landsat-8 were used for estimation of soil moisture in ArcMap. The results of this study indicated that the mean land surface temperature (LST) for the area was estimated to be 23.30°C. Linear slope equations representing the maximum LST (dry edge) and minimum LST (wet edge) for LST-NDVI space scatter plot were evaluated for soil moisture index (SMI) estimation. The SMI values between -0.1484 and 0.3577 was observed with mean and standard deviation of 0.0965 and 0.0238 respectively. The results indicated that the highest mean SMI value occurred in the “very high” elevation class. This was because most high elevated areas are abundantly vegetated (high NDVI values) with relatively low level of human activities that exposes the land surface. This study explores multispectral satellite based soil

moisture assessment for sustainable watershed management.

Keywords: Landsat-8, NDVI, LST, geospatial, elevation, SMI

Fig. 4
Soil moisture index distribution map.



Paper No.
08-2017

PROBABILISTIC ECOTOXICOLOGICAL RISK ASSESSMENT OF IMIDAZOLIUM IONIC LIQUIDS WITH AMINO ACID AND HALIDE ANIONS

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Abstract

Ionic liquids (ILs) are chemical substances with good solubility and low vapor pressure because they are ionized and therefore charged. ILs may harm ecosystem due to their good water solubility. Conventional toxicological studies focus on the evaluation of toxicity (EC₅₀/LC₅₀/IC₅₀/LD₅₀) of ILs for different species for individual ILs. At present, only the limited information is available about the impacts of ILs on the environment. It is difficult to assess the ecotoxicological risks of ILs because of unavailability of exposure data. The main objective of the current research is to use statistical methods using laboratory toxicity values (EC₅₀) from literature to assess potential ecotoxicological risks when the ILs do come into industrial use. Probabilistic ecotoxicological risk assessment (PETRA) method was adopted by using species sensitivity distributions (SSDs) and chemical toxicity distributions (CTDs). Acute toxicity data were collected from literature data on the acute toxicity on four bacterial pathogens *Aeromonas hydrophila*, *Escherichia coli*, *Listeria monocytogenes* and *Staphylococcus aureus*. The SSD method was applied to estimate guideline values to give specified levels of protection for bacterial species. CTDs were calculated for each of the species to obtain the 1st and 5th percentiles to get screening point values (SPVs). SPVs were divided by assessment factors of 1000 recommended by Registration, Evaluation, Authorization & restriction of Chemicals (REACH) guidance to get screening-predicted no-effect concentrations (SPNECs). Imidazolium ILs with chloride and bromide anions were reported to be more risky towards bacteria selected in this research. Out of the four bacterial strains, *E. coli* was reported to be potentially at higher risk because of highest sensitivity when exposed towards ILs.

Keywords:
ionic liquids;
ecotoxicity;
species
sensitivity
distributions,
chemical
toxicity
distributions;
probabilistic
risk
assessment

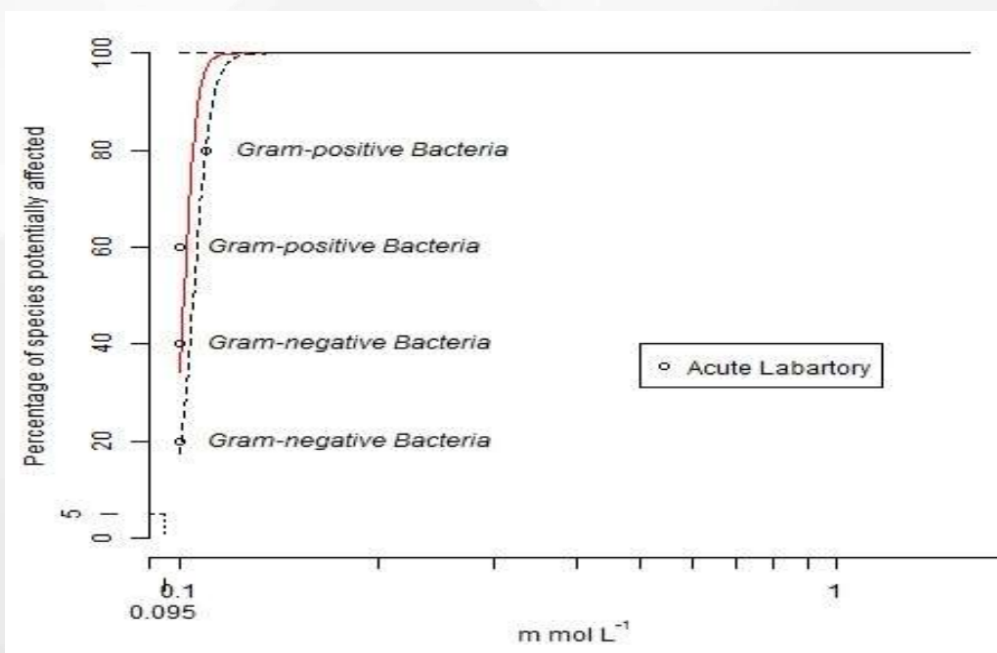


Fig. 5 SSD plot for Type-1 ILs.

Paper No.
11-2017

USE OF QUARRY DUST AS SAND REPLACEMENT IN STRUCTURAL CONCRETE: A REVIEW

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Abstract

Concrete is one of the most widely used construction materials in the world today. As a result, sand, which makes up a large percentage of concrete, has been extensively mined and dredged, leading to environmental and sustainability issues. Many alternatives to sand have been investigated in the past, including quarry dust, which is a by-product from rock mining/quarrying industry and commonly regarded as waste. The environmental challenges associated with the safe disposal of quarry dust poses problems and much research has been carried out to investigate the feasibility of adapting quarry dust into the production of concrete as partial replacement in sand. This paper reviewed research work carried out in the past 20 years on replacement of sand with quarry dust in various types of structural concrete. Criteria assessed in this paper to determine feasibility of quarry dust as replacement include compressive, splitting tensile and flexural strengths, workability, and various durability properties. Quarry dust replacements from certain stones such as marble and granite can equal or surpass the mechanical properties of conventional concrete whilst other types required usage at optimum amount to achieve the same. Usage of quarry dust also comes at the expense of loss of workability, necessitating use of super-plasticizers.

Keywords: quarry dust, concrete, mortar.



Fig. 6 Quarry dust.



Paper No.
12-2017

EUCLIDEAN SPACE DATA PROJECTION CLASSIFIER WITH CARTESIAN GENETIC PROGRAMMING (CGP)

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Abstract

Most evolutionary based classifiers are built based on generated rules sets that categorize the data into respective classes. This research work is a preliminary work which proposes an evolutionary based classifier using a simplified Cartesian Genetic Programming (CGP) evolutionary algorithm. Instead on using evolutionary generated rule sets, the CGP generates i) a reference coordinate ii) projection functions to project data into a new 3-Dimensional Euclidean space. Subsequently, a distance boundary function of the new projected data to the reference coordinates is applied to classify the data into their respective classes. The evolutionary algorithm is based on a simplified CGP Algorithm using a 1+4 evolutionary strategy. The data projection functions were evolved using CGP for 1000 generations before stopping to extract the best functions. The Classifier was tested using three PROBEN 1 benchmarking datasets which are the PIMA Indians diabetes dataset, Heart Disease dataset and Wisconsin Breast Cancer (WBC) Dataset based on 10 fold cross validation dataset partitioning. Testing results showed that data projection function generated competitive results classification rates: Cancer dataset (97.71%), PIMA Indians dataset (77.92%) and heart disease (85.86%).

Keywords: Cartesian Genetic Programming (CGP), evolutionary based classifier, clustering

Table 1 Results of training and testing.

Best/average training and testing rates (%)				
<i>Dataset</i>	<i>Best training</i>	<i>Best testing</i>	<i>Average Training</i>	<i>Average testing</i>
<i>Cancer</i>	96.97	97.71	96.19	94.85
<i>Diabetes</i>	80.36	77.92	73.45	71.07
<i>Heart Disease</i>	77.53	85.86	76.56	80.21

Paper No.
13-2017

ADDITION OF CEMENT LEFTOVER FROM THE HOLLOW OF THE SPUN PILE REINFORCEMENT AS AN ADDITIVE TO SELF COMPACTING CONCRETE

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Abstract

Spun pile have been significantly used widely to construct foundation for most construction project and implemented by developed countries including Malaysia. Spun pile is a reinforced precast and pre-stressed concrete compacted in mould through spinning compaction. Through the spinning compaction produced cement leftover in the reinforcement hollow of the spun pile that could be added into concrete mixture as an additive. The cement leftover of the spun pile were utilized in partial percentage as an additive for cement respectively in range of 0, 10, 20 and 30% (equal percentages). The result compressive strength at 7 and 28 days curing are presented to investigate the properties of the self-compacting concrete added with the cement leftover of the spun pile and other properties investigated include physical properties of fresh concrete and water absorption. The higher compressive strength and lower water absorption of the concrete added with the cement leftover of spun pile compared to the controlled concrete has been obtained for this study.

Keywords: spun pile, cement leftover, additive, self compacting concrete

Fig. 7 Water absorption test result of each SCC batches at 7, 14 and 28 days of wet curing.

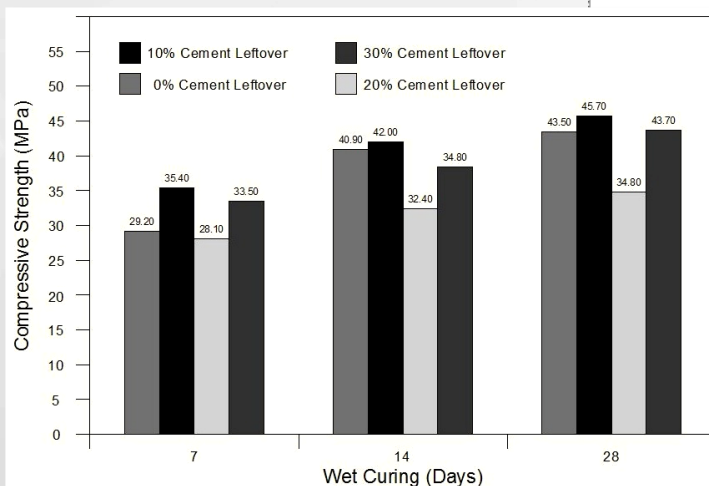
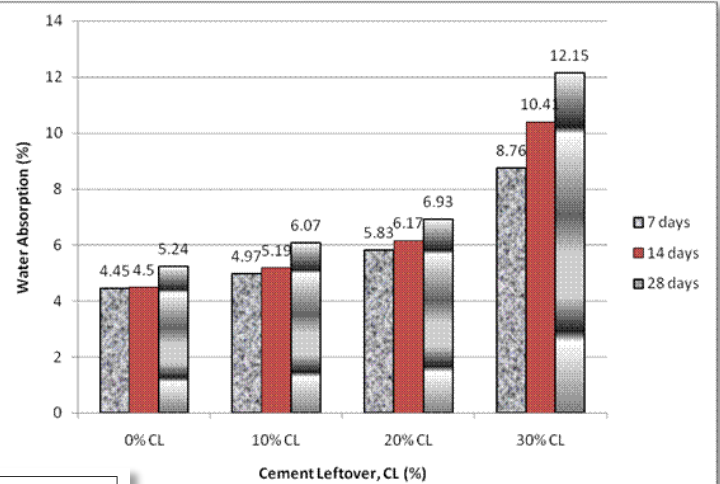


Fig. 8 Compressive strength test result of each SCC batches at 7, 14 and 28 days of wet curing.

Paper No.
15-2017

NUMERICAL ANALYSIS OF INITIAL CO₂ BUBBLES LEAKED IN SHALLOW SEAWATER FROM OCEAN CO₂ STORAGE USING VOLUME OF FLUID METHOD

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Abstract

The aim of this article is to propose a model to predict initial size and shape of CO₂ bubbles leaked in shallow seawater from ocean CO₂ storage. The volume of fluid (VOF) model in FLUENT was employed. The initial bubble sizes were predicted to increase with the increases in leakage velocity and leakage orifice diameter. The leaked bubbles were predicted to form into various shapes. A comparison of bubble shape predicted by the VOF model and observed from the recently published experimental data showed a reasonable agreement. It was found that the VOF method can be a reliable approach for predicting the initial size and the shape which are used to calculate a rising velocity and a dissolution rate of the bubble during the occurrence of the CO₂ leakage in the ocean.

Keywords: CO₂ leakage, CO₂ bubble, initial size, shape, VOF method.

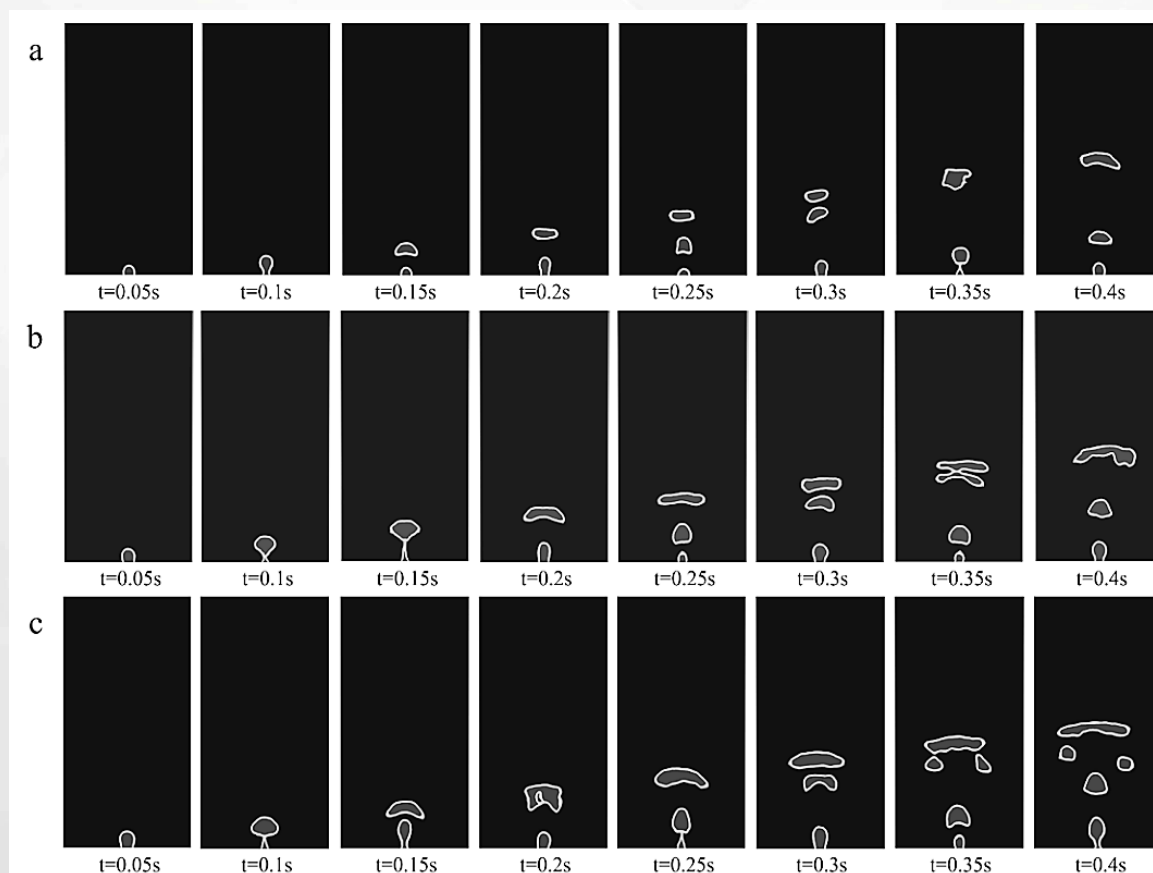


Fig. 9 Predictions of bubble formation after leaking through a leakage hole of 4-mm diameter and leakage velocity: (a) 0.15 m/s, (b) 0.25 m/s, and (c) 0.35 m/s.

Paper No.
18-2017

EFFECTS OF CATALYST BED POSITION ON HYDROGEN PRODUCTION BY METHANE DECOMPOSITION

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Abstract

CO_x free hydrogen can be produced by thermal decomposition of methane. Such process is carried out in a fixed bed catalytic reactor. Where heterogeneous catalytic reaction occur when methane come in contact with catalyst bed at a temperature range of 650-900°C. In this work effects of different catalyst bed positions are investigated on the overall methane conversion to hydrogen. It is found that same catalyst has shown different results when placed at different heights in reactor column. Highest methane conversion of 85% c.a is found when catalyst bed is placed at 25% column height from bottom.

Keywords: hydrogen, methane decomposition, Fixed Bed Reactor, catalyst bed.

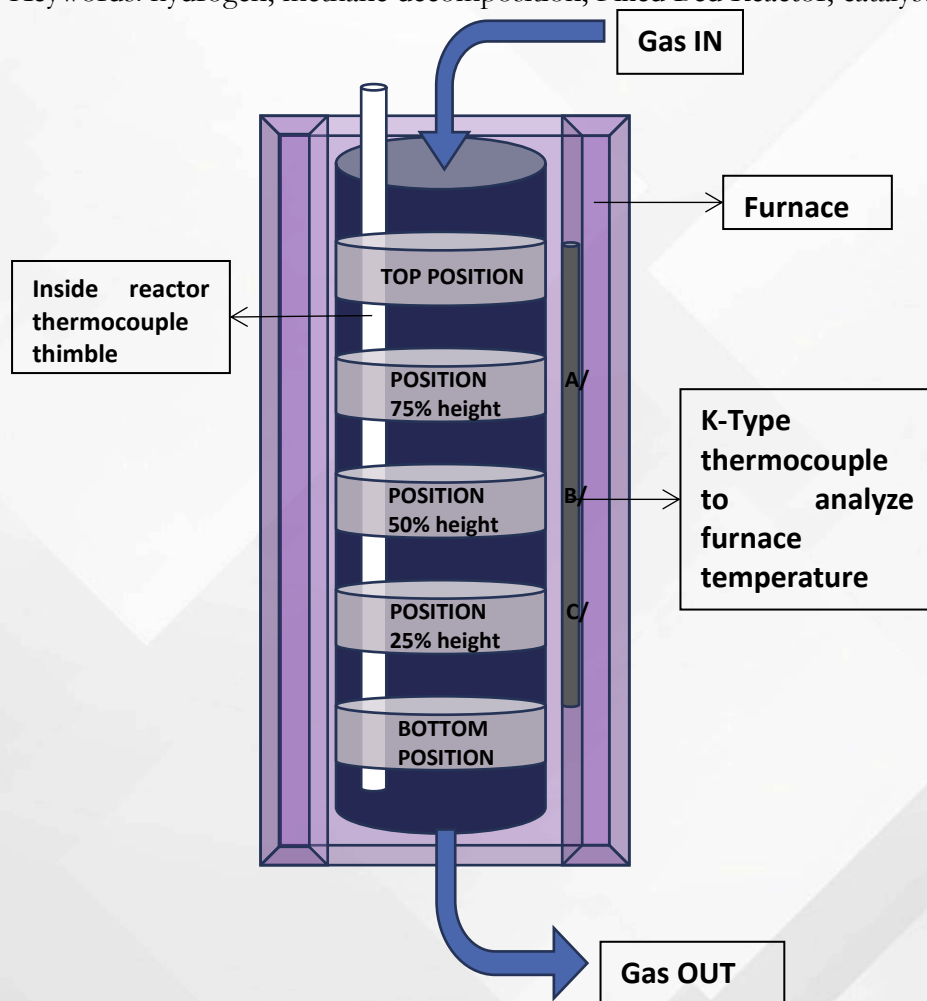


Fig. 10 Schematic diagram of a fixed bed reactor.

Paper No.
19-2017

MINIMUM IGNITION ENERGY OF ALUMINUM NANOPOWDERS AS ENGINEERED NANOMATERIALS (ENMS)

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Abstract

Enormous absence of knowledge regarding dust explosion involving Engineered Nanomaterials (ENMs) has led to the exploration on investigating the Minimum Ignition Energy (MIE) of selected ranges of sizes for aluminum nanopowders. Nano-structure owned by alumina definitely contributes to changes in its chemical as well as physical composition. Thus, testing on MIE determination was conducted on three different particle sizes of aluminum nanopowders; Al-100nm, Al-70nm, Al-40nm. The main aim of the project is to determine the relationship of the particle diameter with their respective MIE. The overall experimental procedure take place using 1.2L Hartmann tube explosion system based on ASTM E2019. Two different dust concentrations were tested (250 g/m³ and 500 g/m³) and the results showed that Al-40 nm have the lowest MIE values of less than 5mJ for both concentrations. For Al-70nm, the MIE value at concentration equals to 250g/m³ is between 10 mJ and 33 mJ, whereas the MIE is less than 10 mJ at concentration equals to 500 g/m³. This contradicts with Al-100nm in which the MIE is between 100 mJ and 200 mJ (c=250 g/m³) and between 33 mJ and 51 mJ (c=500 g/m³). In overall, as particle size decreasing, the MIE is significantly decreasing at respective concentrations.

Keywords: engineered nanomaterials, aluminum dust explosion, minimum ignition energy, nanopowders.

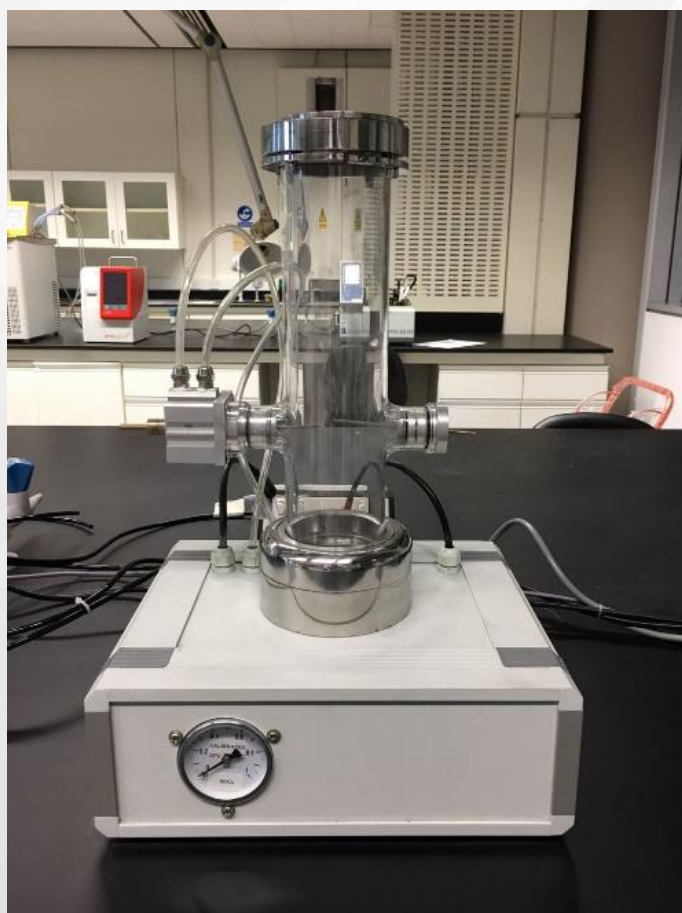


Fig. 11 MIE Cloud Apparatus.

Paper No.
20-2017

THE RELATIONSHIP OF SILVER CONTENT ON FLUX OF POLYSULFONE COMPOSITE MEMBRANE

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Abstract

Nanosilver has become one of the most popular nanoparticles due to its many applications and relatively low manufacturing costs. The aim of this study is to investigate the effect of silver nitrate against water flux made of two polymers which are polysulfone (PSF) and polyethyleneimine (PEI). Polysulfone (PSF) membranes were prepared by phase inversion method using N-methyl-2-pyrrolidone (NMP) as a solvent and water as a coagulant with different additional amounts (0.00-2.00 wt%) of silver contents. The membranes were characterized by scanning electron method (SEM), Fourier transform infrared spectroscopy (FTIR), and permeability test. The permeability test shows that membrane with 1.0 wt% of silver content gives the highest amount of water flux. This work explores the new configuration by embedding silver nitrate in composite membrane consist of PEI/PSF/Ag therefore encourage future work to find effective route to rational design of resulting in higher amount of water flux for better productivity.

Keywords: silver nanoparticles, polyethyleneimine (PEI), polysulfone (PSF), flux, NMP

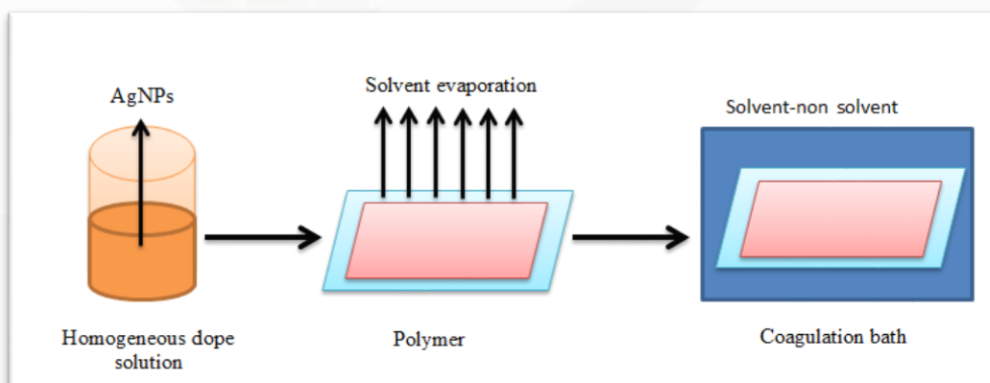
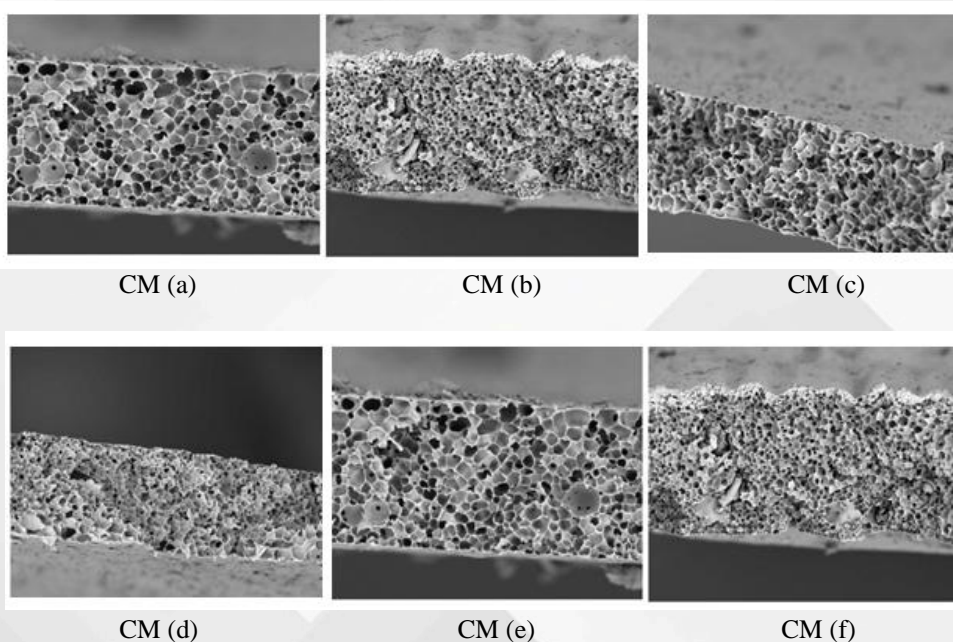


Fig. 12 Schematic illustration of membrane preparation.

Fig. 13

SEM Image for Cross Section Morphology (1500 magnification, 50 μm)

- (a) pure PSU membrane,
- (b) 0.5 wt % silver content
- (c) 1.0 wt % silver content
- (d) 1.5 wt % silver content
- (e) 2.0 wt % silver content
- (f) 0 wt% silver content



Paper No.
21-2017

MULTIPLE-OBJECTIVE OPTIMIZATION TECHNIQUES IN LASER JOINING OF DISSIMILAR MATERIALS CLASSES: A COMPARISON BETWEEN GREY AND RATIO ANALYSES

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Abstract

Multiple-objective optimization using grey relational analysis (GRA) has found widespread applications especially in manufacturing and machining processes that involve complex processing parameters and output attributes. On the other hand, multiple-objective optimization on the basis of ratio analysis (MOORA) is often applied in the fields of construction and economy. One distinctive feature of MOORA is the assessment of relative importance of all responses (i.e. weighting ratio) which are taken into account mathematically whilst GRA emphasis the need of a priori information for accurate assignment of weighting ratio. This paper compares these two seemingly different methods by considering their applications in laser joining of dissimilar materials classes in a number of case studies: (a) laser joining of polymer and ceramic, (b) laser joining of polymer and stainless steel, and (c) laser joining of polymer and aluminium alloy. The outcomes of the two methods are compared and discussed. In majority of the cases, the predicted top-ranked alternatives were comparably matched. It is concluded that MOORA is more favorable compared to GRA since it eliminates prior assumption concerning the relative importance of the measured responses, which can lead to unnecessary bias.

Keywords: laser joining, dissimilar materials, MOORA, grey relational analysis

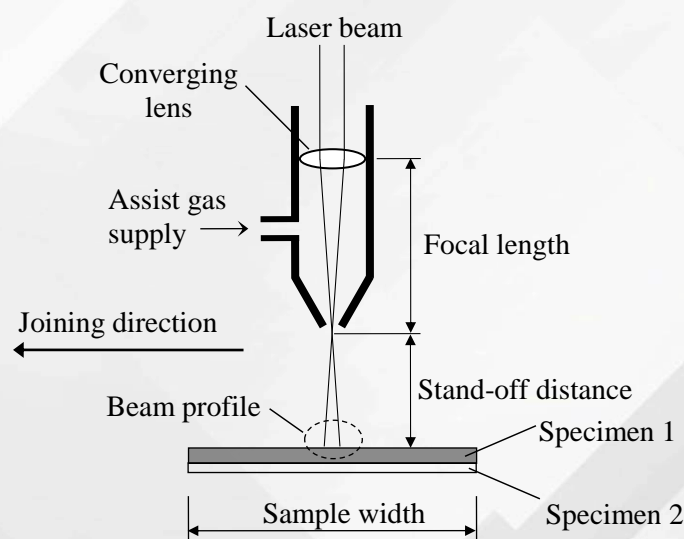


Fig. 14 A typical optical configuration used to perform laser joining process.